# looking ahead

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In This Issue—



## The Lessons of Peenemuende


**By Walter R. Dornberger** *Technical Assistant to the President of Bell Aircraft Corporation*


*The following is a partial text of an article, "The Lessons of Peenemuende," appearing in the March 1958 issue of* Astronautics.* *The head of Germany's W. W. II military rocket effort, Walter R. Dornberger, reviews our own missile and space flight programs in the light of what was achieved at Peenemuende, and urges immediate action to assure U.S. supremacy in these vital fields.*

IN 1936, after convincing the newly created Luftwaffe of the fact [that liquid rockets could be built], we established the Rocket Experimental Station at Peenemuende as a combined Army-Air Force effort.

Equipped with all modern facilities—the first large supersonic wind tunnel, 440,000-lb. thrust static test facilities, material labs, lox plants and big, modern workshops—the station covered an area of about 20 square miles and at its peak had more than 18,000 employees. Even more important, we could launch our rockets from sites not more than 2 miles from our manufacturing facilities.

At Peenemuende, under ideal conditions, the A-3, A-5 and, later, the A-4 (or V-2, as it is called here), as well as the antiaircraft Wasserfall and a score of smaller and less important rockets, were developed. Research, development, engineering, manufacturing up to the test series, and actual testing were accomplished at this location, as well as training troops to handle the weapons. Mass production was later carried out in underground facilities outside of Peenemuende by German industry.

### Peenemuende Military Staff was Small

Peenemuende was a military installation, with a military staff. However, this staff consisted of not more than four officers and approxi-



### Anti-democratic and Anti-hemisphere Conspiracy

• "The anti-democratic conspiracy is now becoming more evident in the Americas. . . . The agitators are infiltrating into government, military circles, the economy, and labor unions. From these positions they try to spread confusion and create a deep feeling of insecurity. There is a single slogan: North Americans are guilty of all the evils afflicting the Indian or Latin peoples of the Hemisphere. . . .

• "The conspiracy springs from sources having two different goals: the establishment of a creole oligarchy by anachronistic caciques who think that the Latin American countries are their personal or family properties; or the execution of orders from the Kremlin . . . whose purpose is to overthrow the really democratic regimes of Western type, and to substitute dictatorial regimes. . . . These two different groups . . . at times . . . develop open alliances. . . .

• "It is necessary that we all take action against this conspiracy before it is too late . . . the countries of the Hemisphere . . . have a common destiny. They must understand and help each other. . . . If these common efforts are to be fruitful, quarrels must be forgotten, and differences surmounted and overcome. Otherwise, the conspiracy will continue to take advantage—as it has been doing successfully—of emotions generated by discord and suspicion."

*Translated excerpts from an editorial in* Noticiario Obero Interamericano, *monthly publication of ORIT (the Inter-american Regional Organization of the International Confederation of Free Trade Unions).*

mately 20 staff members. All others—division and section chiefs, as well as laboratory heads—were civilians.

Peenemuende was organized like a large private research institute combined with a production plant. The administrative departments of the Army and Air Force had absolutely no control over Peenemuende. I personally was the court of highest appeal. I was responsible only to the Chief of the German Army, and there was no technical or military office in the Army or Air Force that had any say in the organization itself or in the development work going on there.

Today, in this country, there may be 20 or more offices in the Armed Forces which have a say in any missile project. Moreover, you may have to convince hundreds of different people if you happen to come up with a new project. Equally important is the fact that these people change every couple of years, which means it's enormously difficult to insure continuity of a project.

As Peenemuende Commander, I was responsible for setting up the budget for the operation on a blank-check basis. In this country, budget problems can upset missile projects for months on end, as engineers and scientists whose main concern should be to get the job done spend long periods of time trying to justify the most obvious expenditures.

Peenemuende was the first weapons system organization in the world, set up to handle everything from research and development through mass production to training of troops in handling the weapons and supply for forward echelons. The entire operation was under a single commander who held down his post for 15 years.

Again, this is in sharp contrast to the present situation in this country, and points up the vital need for continuity in missile projects.

Soldiers with technical backgrounds formed the backbone of Peenemuende. Inside the fence, they worked and were treated as civilians, and even received the same salaries as civilians doing comparable jobs. No problems of rank ever arose. It was not at all uncommon to see a major working at the plant under a non-com.

Scientists from universities and research institutes were called in only if there was a scientific problem to solve which we could not solve ourselves. When they were called upon, it was to *solve* a problem, not to discuss it or philosophize about it.

German industry worked on component parts according to specifications set up at Peenemuende. One innovation we introduced was that of the traveling engineer, who went from plant to plant to check on production problems. He was responsible for a particular part of the weapon system and could authorize changes or modifications without prior permission from headquarters. When he returned to Peenemuende, he would inform us of any changes that had been made, and these would be included in the blue-prints and specifications.

Today, making even the slightest modification is not up to the company producing the missile, but involves getting official approval from half a dozen different offices.

At Peenemuende, we found that mass production of a big rocket could be accomplished within two years of the first successful firing of a prototype.

Testing, testing, testing, under simulated flight conditions, was our fundamental approach. Later in development, and again in production, more and more of these tests, at first believed essential, were dropped. Toward the end, we were manufacturing 30 V-2's a day and had hot-run tests of as many as 30 engines on one static test stand within eight hours.

Is there any facility in the U.S. where this could be accomplished today, more than 15 years later?

## Firing Problems

We also learned that a complicated weapon system of this type cannot be fired according to a precise schedule, but only when it is thoroughly tested and ready for launching. I mention this only in view of the fact that so much has already been said about our ability to retaliate against an enemy missile attack by launching our own missiles within five minutes after such an attack.

In the development phase at Peenemuende, we were very careful to separate all command activities from launching activities. We learned from experience to leave the launching people alone. As a matter of fact, there wasn't even any telephone communication between the launch area and headquarters at Peenemuende, and, when I wanted to see a launching, I would watch it secretly from the forest nearby.

Needless to say, the recent Vanguard TV-3 launching might be held up as a horrible example of the wrong way to go about it.

Another thing we learned was that warhead size and propellant combination must be fixed before you start making calculations for a big rocket. Neither can be changed during development work. If changes are made all earlier work becomes a waste of time and money.

We also learned that it is extremely important to bring production and operations people into the picture at a very early stage.

Close cooperation between engineers and production people is imperative. At Peenemuende, we had a regulation which called for all division, section and branch chiefs to spend at least an hour a day at the production plant, talking to people who handled the hardware, and learning about their problems.

## Teamwork is Vital

In this country, we have an Iron Curtain that separates the engineers and production people.

Experience and teamwork are vital to a missile development program. Failures should not be blamed on anybody.

Strong leadership is essential to the success of such a project. The man who heads up the project must be able to understand the language of the specialists working for him, to evaluate the work that is being done and to set goals even in specific fields.

At Peenemuende, even while working on military weapons, we had a clear concept of what was to come next. In the field of long-range guided missiles and in the coming space age, getting an early start on the next phase saves time, money and energy. We were fully aware of future possibilties. According to our thinking, this was our schedule:

1. Automatic long-range singlestage rockets (A-4 or V-2)
2. Automatic long-range gliders (A-9b)
3. Manned long-range gliders (A-9B)
4. Automatic multistage rockets (A-9/10)
5. Manned hypersonic gliders (A-9B/10)
6. Unmanned satellites
7. Manned ferry rockets to satellite orbits
8. Manned satellites
9. Automatic space vehicles
10. Manned space vehicles

This was for us a natural sequence which would materialize when the necessary powerplants for such vehicles were developed. The need for high-energy propellants, nuclear rockets, and ion and photon rockets was recognized very early in the game.

And yet here we are today, still using the same propellant combinations we were using 25 years ago in Germany. We haven't even succeeded in developing chemical propellants which will provide us with 30 to 50 per cent more specific impulse—combinations like fluorine-ammonia, fluorine-hydrazine and liquid hydrogen-oxygen.

When World War II ended, only 180 Peenemuende people came to the U.S. By contrast, more than 4,000 were shipped to Russia, along with all the Peenemuende equipment and the production facilities in Nordhausen. There they worked with their new masters in re-establishing the German state of the art as it had existed in 1945.

In 1947-48, the Russians fired literally hundreds of V-2's, and succeeded in increasing their range from 200 to 700 miles. After that, the group was isolated and returned to Germany. The Russians had learned enough to continue by themselves.

Along with the experience they gained in handling long-range rockets, the Russians also got the Peenemuende way of thinking and the schedule for space conquest we had set up as far back as 1942. The satellites are only the first step. Another look at the schedule is all that's necessary to predict what lies ahead.

Let me conclude with a brief excerpt from a speech I made to my staff at Peenemuende on the day of the first successful V-2 launching, in October, 1942:

"The following points may be deemed of decisive significance in the history of technology: We have invaded space with our rocket and for the first time—mark this well—have used space as a bridge between two points on earth. We have proved rocket propulsion practicable for space travel. To land, sea and air may now be added infinite empty space as an area of future intercontinential traffic, thereby acquiring political importance. This is the dawn of a new era in transportation, that of space travel . . .

## Space Landings

The development of possibilities we cannot yet envisage will be a peacetime task. Then, the first thing will be to find a safe means of landing after the journey through space . . ."

Here it is 15 years later, and we still haven't solved the problem.

In the first summary I wrote after Peenemuende was overrun, in May, 1945, I noted that the first nation with a manned artificial satellite would be a world leader. I still believe this to be true—and, today, perhaps more true than ever.

A centralized agency to follow through with the program we envisaged at Peenemuende more than 15 years ago is imperative if we, as a nation, are not only to keep pace with, but surpass, the Russians in the field of space flight.

But the time to start doing something about it is right now. I have no fears about the next five years. It's the five years after that which are dangerous. If we fail to take the necessary steps now, today, we're in trouble.

## National Commission on Money and Credit

NPA Chairman H. Christian Sonne has recently been appointed Vice Chairman of the National Commission on Money and Credit. The Commission, which will operate as an independent unit, has been established through the initiative of the Committee for Economic Development (CED), with financial support from the Ford Foundation.

The Commission will "make studies and recommendations concerning monetary and financial institutions and their powers and policies, with a view to promoting more effectively the major objectives of national economic policy."

According to CED Chairman Donald K. David, the Commission is expected to seek the answers to such questions as: "just what reliance should be placed upon fiscal and monetary policies to achieve economic stability; and, are the existing arrangements for coordinating monetary and credit policies, and for assuring consistency of these policies with other economic policies of the government, satisfactory?"

Other NPA members on the Commission are Beardsley Ruml, Stanley H. Ruttenberg, and Isador Lubin, and NPA National Council members Jesse W. Tapp, Robert R. Nathan, and Willard L. Thorp.

## Bibliography on Economic and Social Effects on Automation

Six hundred items concerned with the economic and social implications of automation have been collected in a bibliography recently published by Michigan State University's Labor and Industrial Relations Center.

The majority of items are briefly described, although about fifty nonannotated bibliographies and reference sources on various aspects of automation are also included. The bibliography offers selected references on: a comprehensive discussion of automation; the relationship between automation and changes in employment, and the problems resulting from technological unemployment.

Also included are sources on the impact of automation on selection and training of workers, worker motivation, personnel relations, and the personality of the worker; the impact of automation on administration and negotiation of collective bargaining contracts; and automation and the selection and educational requirements for executives.

References on the effects of the introduction of automatic equipment into an office, and to specific case studies of company experience with automation are also included.

(*Economic and Social Implications of Automation, A Bibliographical Review*, Gloria Cheek, Labor and Industrial Relations Center, Michigan State University, East Lansing, Michigan: 1958, 125 pp., $1.25.)

## —The People of NPA—

R. E. Brooker

NPA Trustee R. E. Brooker became President of the Whirlpool Corporation, a full line manufacturer of major home appliances, on May 12th.

Mr. Brooker has pursued a significant merchandising career. In 1944, he joined Sears, Roebuck & Company in Chicago as a buyer, from which he advanced to Department Superintendent in 1947, to Vice President in charge of factories in 1951, and to membership on the Board of Directors—a position he still holds.

He came to Sears, Roebuck—with a technical background in engineering, merchandising, and manufacturing—from the Firestone, Tire and Rubber Company, where he had been in charge of the West Coast Division retail stores from 1934 to 1944. Mr. Brooker began his merchandising career in 1927 as a buyer for the Southern California Edison Company, after receiving a B.S. degree in civil engineering from the University of Southern California.

He is a Director of Swift and Company and the Whirlpool Corporation, in addition to Sears.

Among numerous civic activities, he is a trustee of the Illinois Children's Home & Aid Society, the Illinois Institute of Technology, the Wesley Memorial Hospital (Chicago), and a member of the Board of Managers of the Central YMCA. His professional affiliations include the Chicago Club and the Economic Club of Chicago.

# National Science Foundation and Research and Development

EXPENDITURES for research and development have grown from $5.4 billion in 1953 to almost $10 billion in 1957, according to the National Science Foundation. The personnel manning this "industry" has also increased significantly. Over one-fourth of our natural scientists and engineers, plus 400,000 supporting personnel were engaged in research and development by 1954.

Recognizing the economic importance of research and development, and in response to many inquiries about its economic and social implications, the National Science Foundation recently conducted a Conference on Research and Development and its Impact on the Economy.

THE CONFERENCE was the first to bring together leaders in government, private industries and universities; research directors, economists and social scientists for the purpose of considering the impact of research and development in selected industries; the place of basic research in private industry; and the impact of research and development on the total, dynamic economy. NPA Chief Economist Gerhard Colm was among noted Conference discussants, and participated in a symposium on the "Character of Research and Development in a Competitive Economy." He also summarized the afternoon Conference Topic, "The Impact of Research and Development on the Total Economy."

Conference participants examined three industries with widely different organizational structure and research and development problems. The participants also discussed the interrelationships of the various fields of knowledge in research; the interdependence of the various phases of the research process; and the interdependence of the social institutions of government, industry, universities, research institutes and foundations engaged in, or supporting, research and development.

"To broaden the knowledge of research and development," the National Science Foundation will undertake a new series of studies, Foundation Director Alan T. Waterman announced to the Conference. The first—conducted with the Case Institute of Technology—will attempt to construct a "model" and methodology for determining the relation of research to the growth of three selected companies in the same industry, then, companies in competing and complementary industries. The study will attempt to generalize about the impact of research and development on the growth of the total economy.

THE SECOND PROJECT—to be conducted in cooperation with the Carnegie Institute of Technology—will analyze the decision-making process as it operates on innovation and research and development, based on the examination of numerous organizations. The Foundation will also conduct a survey of expected expenditures in research and development.

(Conference on Research and Development and its Impact on the Economy, proceedings available from: National Science Foundation, Washington, D.C.: May 20, 1958.)

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## International Conference of Agricultural Economists

"Agriculture and Its Terms of Trade" will be the theme of the Tenth International Conference of Agricultural Economists to be held at Mysore, India, August 29 to September 9. Conference participants will consider "the problems of balance between agriculture and other activities in the process of economic growth of states and the development of a sound world economy." Conferees will see Indian farms and farmers, and will have an opportunity to visit other Asian countries.

The Council of Economic and Cultural Affairs has granted $10,000 towards Conference general expenses. Devoted to "supporting teaching and research in agricultural economics and community development in Asia," the Council is headed by John D. Rockefeller, 3rd, and under the Executive Directorship of Arthur T. Mosher, author of the NPA study *Technical Cooperation in Latin American Agriculture.*

(For further information: Prof. H. C. M. Case, International Conference of Agricultural Economists, University of Illinois, Urbana, Illinois.)

## The Metropolitan Problem

IN 1957, city dwellers will still be faced with what Luther Gulick calls the "metropolitan problem"—unsatisfactory housing, traffic and parking delays, lack of schools and recreational facilities, youthful delinquency and crime, water shortages, bad sewer conditions, depressing "old style" city centers, and mounting taxes—unless metropolitan government lays the groundwork for modernization.

In *Changing Problems and Lines of Attack*, a study of the growth and problems of government in the metropolitan areas, Mr. Gulick points out the gap between what the people want and what they get from metropolitan governments. "Easier inter-communication and commerce among the people is the raison d'etre of the urban center, the chief dynamic reason for the existence and growth of the modern metropolitan region."

PRECEDING MODERNIZATION, the study points out that government must help to organize and finance the planning of a transportation system pattern; obtain agreement for future land uses; establish and enforce controls and zoning; clear away over-obsolete properties to make way for modern buildings; and invest public funds in streets, water supply, sewerage, schools and open spaces.

These problems cannot now be solved, he contends, for present government machinery is inadequate, obsolete, and for some requirements there is no machinery at all. This "government breakdown" has resulted because: some services have not been assumed by any government agency; problems which have become inter-related are still being handled separately; and tax support of government activities has been weakened by population shifts from the metropolitan area.

Included in the "lines of action" that the study proposes to meet the metropolitan problem are: defining the metropolitan area—geographically, socially, economically, and politically; reviewing government needs and services, land uses and transportation networks; and analyzing the potential contributions of existing county, state, and federal institutions.

In certain large metropolitan areas, the study proposes the establishment of a Metropolitan Council, a sub-legislative body directly responsible to the voters.

This Metropolitan Council would be given broad and closely defined legislative functions over the metropolitan area, subject to general state laws. It would deal with common resources, and would adopt the minimum service standards, as in fire protection and crime control. The Council would develop the skeleton of a highway and transportation system, and would be the co-ordinating agency for civil defense.

(Luther Gulick, *Changing Problems and Lines of Attack*, Governmental Affairs Institute, Washington, D.C.: August 1957, 30 pp.)

*At the pre-dinner reception of the NPA Annual Meeting, March 31 at the Statler-Hilton in Washington, D.C. (left to right): NPA National Council members Walter M. Ringer, Chairman of the Board, Foley Manufacturing Co., Minneapolis, Minnesota; Samuel F. Hinkle, President, Hershey Chocolate Corp., Hershey, Pennsylvania; William H. Francis, Jr., Attorney, Houston, Texas; William L. Batt, Chairman, NPA National Council Membership Committee; Hon. Samuel N. Friedel, member of the U.S. Congress from Maryland; and Alfred H. Williams, President of the Pennsylvania-New Jersey-Delaware Metropolitan Project, Inc. and recipient of the 1957 NPA Gold Medal Award.*

### Long-range Economic Projections

NPA has a special project under way on long-range economic projections (see *Looking Ahead* December 1957). Projections of the national economy for 1965 and 1970 are now being prepared and a preliminary report is scheduled for next fall.

We would like to hear from readers who are interested in economic projections. We would like to have more detailed information about the uses of projections in business firms and other organizations, and will send a description of the work being undertaken at NPA to those who express an interest.

## The "Progress Manufacturing Company"

THE "Progress Manufacturing Company" is the imaginary name of a typical small-sized manufacturing firm selected by the Organization for European Economic Cooperation as the basis for a study on the techniques of long and short-range company planning.

The O.E.E.C. report is intended for use by managers of small and medium-sized companies, and is a condensation of material presented at a series of seminars held in nine O.E.E.C. member countries for top and middle management personnel.

The "Progress Manufacturing Company" began production of latches and locks in 1931 with a few men and machines. Although sales increased and the company employed 350 men by 1950, the company had serious financial problems, resulting in frequent production shut-downs. There were also administrative and technical problems in various departments, labor problems, and the firm's agents missed sales opportunities to large building firms.

Two company planning experts were engaged in 1950 to examine what could be done to correct these conditions and increase the level of earnings. As a result of studying the basic management structure, short and long-term forecasting was initiated; a manufacturing plan was established; a financial plan determining the company's financial needs from 1950 to 1960 was outlined; and certain new administrative functions were established.

THE REPORT NOTES the specific problems of the "Progress Manufacturing Company," which may be common to many other businesses, discusses the planning principles which have been employed to solve these problems, and illustrates with numerous charts, the use of these planning techniques.

(*Company Planning and Production Control, The Story of a Manufacturing Company,* O.E.E.C., 1346 Connecticut Ave., N.W., Washington 6, D.C.: March 1958, 94 pp., $1.00.)

## The Farmer—Stereotype and Reality

A STEREOTYPE of values, beliefs, and attitudes has generally been applied to farm people because of their long social and geographic isolation. The farmer has been regarded as "more individualistic, more fatalistic, more conservative, more democratic, more puritanical, more susceptible to mass hysteria, more thrifty and frugal, more suspicious of strangers, more frank and outspoken . . ." than nonfarm people, according to Lowry Nelson's *Rural Sociology* article, "Rural Life and Mass Society."

However, in today's industrialized society, Mr. Nelson declares there is no longer "such an entity as the farmer." Lowry Nelson is the author of the 1953 NPA study, *Migratory Workers—the Mobile Tenth of American Agriculture* and the 1956 NPA agriculture study, *Land Reform in Italy.*

THE TECHNOLOGICAL ADVANCES in American life, including its agricultural aspect, have pressed the farmer further and further from self-sufficiency, caused him to specialize in what he produces, made him dependent upon town and urban workers for the supplies needed to carry on production, made more complex his social relations with business and labor; in short, relatively integrated him into the national economy," Mr. Nelson points out.

Just as the gap between farmer and nonfarmer is narrowing in education, housing, and availability of hospitals, so is the difference in farm and nonfarm attitudes on basic issues, he states.

As farmers send their children to village schools, and as country churches consolidate with village churches, and as the rural area is increasingly invaded by part-time or nonfarm people, the attitudes of farmers have become similar to those of other groups.

THE PUBLIC OPINION POLLS have indicated that, by educational categories, there is little difference in attitude between farmers and nonfarm groups on basic issues. Moreover, Mr. Nelson points out that there is no issue of national interest on which farmers present a solid front of opinion.

("Rural Life in a Mass Society," by Lowry Nelson, in *Rural Sociology,* The University of Kentucky, Lexington, Kentucky: March 1957, $1.25 per single issue, $4.75 per year.)

## *Looking Ahead*

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